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THE DEVELOPMENT OF AN INSTRUCTIONAL PRODUCTIVITY SYSTEM

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BACKGROUND

School District 916

Considerable emphasis is being placed on accountability and efficiency in education. However, in spite of this emphasis, there does not appear to exist a comprehensive operating instructional information system that provides a means by which educational performance can be meaningfully assessed. Special Intermediate School District 916, a recently established area vocational-technical institute in suburban St. Paul, Minnesota, has made considerable progress in developing a vocational instructional data system. Dr. William C. Knaak, the Superintendent of District 916, has conceived and initiated the development.

The district has a commitment to providing and coordinating vocational-technical learning experiences for high school, post-high school, and adult students from eight member elementary-secondary school districts. It is committed to provide these experiences at a quality and cost level competitive with other public and private training institutions and agencies. Through advisory committees and cooperative programs with industry, the district strives to keep its occupational training programs highly relevant to occupational needs.

To achieve its goals, the district has selected an alternative to teacher-centered modes of instruction. This alternative is a learner-centered instruction model involving flexible program scheduling, performance contracting, and individualized instruction. In this mode, individualized learning packages (units of competency) permit each learner to progress at his own rate and to gain advance placement for those competencies he can demonstrate prior to beginning the learning activity. In addition to adjusting the student rate of learning, the packages are designed to accommodate the student's style of learning and give him more than one option to achieve

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a specific performance objective. The packages define what is to be learned and under what conditions and what degree of skill is required. Learner-centered instruction has been implemented at District 916 with a diverse student population, consistent with their "fail-safe" learning environment.

Quality of Education Act

The 1971 Minnesota legislature passed a bill to create a Council on Quality Education. The council funded 32 innovative educational projects during the biennium. The projects are designed to "respond to the education needs of public school students, the professional growth and satisfaction of the school staffs, the effectiveness and efficiency of present schools in their learning processes, continuing pupil unit cost escalation and the resultant financial crises which this brings about."

School District 916 received a grant from the Council to develop and implement its "Instructional Productivity System". As such, the system is consistent with the Council's accountability emphasis. The system was to develop procedures through which the district can derive the effectiveness of its instructional system by the design, development and implementation of program competency and instructional productivity modules. It is intended that the instructional efficiency information be utilized in establishing cost effectiveness and serve as criteria upon which to base decisions relating to instructional methods, media, equipment and facilities.

Project Approach

To supplement its own staff in the development of the system, District 916 contracted with Educational Management Services, Inc. (EMS) of Minneapolis. EMS is a firm which provides consulting services in a wide range of education-related areas. One full-time and three part-time EMS staff members were assigned to the project. They provided technical assistance to the district staff on project activities.

Project activities were related to one of three project components. They were: 1) the selection and implementation of instruments and procedures for assessing the students' level of knowledge and vocational competency upon enrollment; 2) the design, development and implementation of procedures for assessing the actual learning progress of enrolled students in comparison with his expected progress; and 3) a computer-based system for monitoring student progress as well as for deriving program unit costs and related effectiveness information.

ASSESSMENT COMPONENT

General Enrollment Assessment

Enrollment Assessment takes place after the students have been admitted into the vocational program being offered by District 916 on a first-come first-served basis. The purpose of enrollment assessment is to gather information to assess potential factors which might interfere with a student's

learning. If such factors are detected, the information is further used to determine how these learning impediments might be removed.

Through the use of an assessment advisory committee which was representative of all sectors of the 916 instructional staff, a model for enrollment assessment and program readiness facilitation was developed. The model calls for a general assessment of the student's computations, communications, academic ability, and attitude upon entry into the school. If a student shows a deficiency in any of these areas, he is referred to the instructional support center for further diagnosis. Upon identification, he is then either sent directly to his instructional program or to a remedial program in the basic skills area or to school psychologists and/or outside community agencies that assist staff with more difficult problems.

The district is in the process of establishing norms for its assessment instruments and attempting to determine appropriate cut offs for students in the various programs.

Specific Program Assessment

The purpose of program assessment is to determine when students have mastered the requisite cognitive, affective, and psychomotor objectives for a particular unit or learning package within their program. As a first step in the development of individualized learning systems, tasks for a particular occupation are determined. After the analysis, the indvidual learning packages are developed. Specifically, the packages consist of: 1) a defined task; 2) a terminal performance objective; 3) one or more micro-performance objectives; 4) learning steps; 5) resources; and 6) criterion exams and/or performance checklists. The criterion exams represent the "knowing" assessment for each package; whereas, the performance checklists represent the "doing" assessment. The items on the exam determine if a student has mastered all the stated micro-performance objectives for the package. The same exam can be used for pre-test purposes in the event that a student wants to check out of a given learning activity.

The items on the criterion exam are in multiple choice format with a number of items referenced to each micro-performance objective. This format was chosen for its examination appropriateness and objectivity resulting in accurate replication of scoring.

Performance checklists are developed in two varieties. They are used to evaluate a performance through observation, observing the student while performing, or for evaluating a product after completion. The checklists list the procedural steps necessary to complete a task and enable the evaluator to determine whether the specific steps were completed satisfactorily at a specified acceptance level.

Program supervisors establish item files for storing test items and are able to group the items to test a particular package or a larger unit of study. Information is kept on the student responses to these items and an item analysis is conducted. The file also is updated based upon item analysis information.

SYSTEMS DEVELOPMENT COMPONENT

System Overview

The purpose of this project component is to develop a computer-based system capable of accepting, reporting and processing student progress data in a format which can be interfaced with the program oriented budgeting and accounting systems to provide indicators of the program instructional effectiveness. The system consists of six operational modules or sub-systems. Each module of the system is composed of one or more computer programs which either restructure data of existing files or generate reports.

Major inputs to the system include the student enrollment form which contains demographic, program and test information on each student. This form is printed on a continuous form paper. The computer generated form is used as a turnaround document to update the student data file. A timecard is kept by each student for each learning package that he completes. Upon completion, the timecard is given to the instructor who, in turn, validates it and submits it for processing. Data from the timecard are used to determine the amount of department instructional resources utilized by a student in mastering a particular package and subsequently for his entire program.

The two major files created and maintained for the system are the program-unit file and the student master and trailer files. These files are merged and integrated with the accounting subsystem to produce a number of monthly reports.

The reports generated by the system include: 1) a monthly report of graduates which is necessary to identify graduates as they complete their individualized programs; 2) an attendance report which is derived from the timecard input; 3) a student progress report which gives the status of each student on his program, as well as a comparison to other students in his program; and 4) a program progress report which gives the status for all students within each program in terms of completion.

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ABSTRACT

School District 916 in St. Paul, Minnesota, a special district which provides vocational-technical learning experiences for high school and post-secondary students, developed an Instructional Productivity System (IPS). The IPS was designed to allow the district to monitor the success of the learner-centered instructional model whose features included flexible scheduling, performance contracting, individualized instruction, and accountability. Working in cooperation with a consulting firm, Educational Management Services, project components were developed to: 1) assess students' knowledge and skills upon entering vocational training; 2) measures students' actual learning progress against expected progress; and 3) implement a computerized system to monitor student progress and to correlate this information with program costs and effectiveness data. Reports generated by the system include monthly reports of graduates, attendance reviews, student progress reports, and program progress reports. (PB)